CHAPTER 4. EVALUATION OF ALTERNATIVES

BART's System Expansion Criteria were adopted by the BART Board in December, 2002. The following section examines each of the four transit options according to BART's ten key criteria:

- **Transit Supportive Land Use and Access**
  1. Existing Residential and Employment Density
  2. Existing Intermodal Connections
  3. Land Use Plans and Policies
- **Cost Effectiveness**
  4. Cost per New Rider: Base Case
  5. Cost per New Rider: with TOD
- **Regional Network Connectivity**
  6. Regional Transportation Gap Closure
- **System and Financial Capacity**
  7. Core System Improvements
  8. Capital Finance Plan
  9. Operating Finance Plan
- **Partnerships**
  10. Community and Stakeholder Support

Transit Supportive Land Use and Access

1. Residential and Employment Density

BART's expansion criteria are focused around generating ridership for BART and doing it in a cost effective manner. By far, the most important factors for the generation of transit ridership are the population and employment densities within a half mile radius of the stations. Simply put, the more people there are within walking distance of a transit station, the greater the potential market for transit.

Using ABAG's 2020 Projections[1], the team calculated the number of dwelling units per acre and the number of jobs per acre within a half mile radius of each potential station. A summary by key segment is shown below.

Figure 4-1
Population and Employment Density: Baseline Scenario

	Option 1		Option 2		Option 3		Option 4	
Corridor	*du/acre*	*jobs/acre*	*du/acre*	*jobs/acre*	*du/acre*	*jobs/acre*	*du/acre*	*jobs/acre*
Altamont	1	2	1	2	1	3	2	4
	Low	Low	Low	Low	Low	Low	Low	Low
Livermore/ Amador	3	12	2	15	2	16	0	1
	Low	Low	Low	Low-Medium	Low	Low-Medium	Low	Low
I-680	2	23	2	21	2	20	3	34
	Low	Medium	Low	Medium	Low	Low-Medium	Low	Medium

Even in 2020, low densities throughout the study area produce primarily "low" and "low-medium" scores. The Livermore and 680 corridors are boosted solely by the stations in Walnut Creek, Bishop Ranch, Dublin and Hacienda.

[1] This criteria focuses on "existing" population and employment densities. However, due to data availability limitations, 2020 projections were used as a surrogate.

2. Intermodal Connections

In order to allow nearby residents and employees to use transit, it is important that there be good connections from the station to their front doors. The comprehensiveness of the bicycle and pedestrians networks is especially important. Feeder buses help expand the catchment area of transit beyond the half-mile radius. Some locations in the study area are rich in multimodal connections, including the downtowns of Walnut Creek and Livermore; others are more isolated. The table below averages the ranking of all of the potential stations in each of the three key segments.

Figure 4-2
Intermodal Connections

Corridor	Option 1	Option 2	Option 3	Option 4
Altamont	Low	Low	Low-Medium	Low
Livermore/ Amador	Medium	Low-Medium	Medium	Low
I-680	Medium	Medium	Medium	Medium

3. Land Use Plans and Policies

Each of the cities within the study area has begun exploring Transit Oriented Development plans and policies, and some have recently completed or are about to complete showcase projects, such as Dublin's new "transit village" at the Dublin/Pleasanton station. As part of the next stage of a BART extension planning process, BART would work with each of the affected communities to ensure policies are in place that would make best use of a major public investment in new transit service. Local land use decisions are entirely the responsibility of local governments, but land use patterns are the primary factor in determining transit's success. To be a responsible steward of its public funds, BART provides guidance to cities set land use plans and policies that will maximize BART's ridership and minimize its cost per passenger ride.

Recommendations for transit supportive land use plans and policies can be found in two BART documents: "Access Guidelines" and "Transit Oriented Development Guidelines." Those documents provide guidance on key factors including:

- **Density** is the single greatest determinant of transit ridership, simply because the more people there are living and working nearby, the greater the numbers that may take transit. More importantly, meeting a certain threshold of potential riders allows BART to increase service frequency, which in turn attracts even more riders. In both Pleasanton and Pleasant Hill, denser developments near BART generate 25-50% fewer peak period auto trips than comparable developments far from BART.[1]

- **Design**. In order to ensure that added density near transit does not damage community character, it is critically important that high quality design be provided, and that increases in density be gradual. The edges of a Transit Oriented Development project should meet adjacent uses with a compatible scale and character.

- **Pedestrian Orientation.** Transit's success relies heavily on excellent pedestrian networks. Good pedestrian facilities expand the potential market area for a rail station and make it possible to reach more distant destinations by feeder bus. Sidewalks should be provided on both sides of all streets, with street trees and/or on-street parking providing a buffer between the sidewalk and the roadway. In order to improve pedestrian crossings, roadway cross-sections should be minimized within the context of a network-wide congestion management plan. Finally, the zone between the sidewalk and adjacent uses should be carefully planned, maximizing shop windows and front gardens, and minimizing parking lots and blank walls.

[1] Analysis of 2000 Census Journey-to-Work Data for Hacienda Business Park and elsewhere in Pleasanton, conducted by Nelson\Nygaard for the East Bay Community Foundation, 2003. Similar results for the Pleasant Hill BART station by Robert Cervero, et al.

- **Performance Measures.** Many cities measure the success of their overall transportation network solely by Automobile "Level of Service," or the seconds of delay that a typical vehicle will experience during the peak period at a given intersection. Near transit centers, it is important to provide complementary performance measures for buses, bicycles and pedestrians, as well as consider "person-based" rather than "vehicle-based" measures of delay.

- **Parking** should not be treated the same at Transit Oriented Developments as at other projects. The primary supposition of TODs is that more people will take transit to them than would be expected elsewhere. As a result, it is important to reduce minimum parking requirements in residential and commercial development to account for the expected mode shift. Some cities, such as San Francisco and Eugene, OR, have eliminated minimum parking requirements near transit centers and replaced them with parking maximums as a primary strategy for managing congestion.

- **Connectivity** of the street network is another key to TOD success. Small blocks help to make both feeder transit and pedestrian access work well. Where large blocks must be provided, a fine-grained network of pedestrian "cut-throughs" should be provided.

The chart below summarizes existing corridor characteristics as well as the reasonable potential for each corridor to implement transit supportive policies.

Figure 4-3
Summary

Corridor	Current Rank	Potential Rank
Altamont	Low	Medium-High
Livermore/Amador	Low-Medium	Medium-High
I-680 Corridor	Medium	High

Cost Effectiveness

4 & 5. Cost per New Rider: Base Case and With TOD

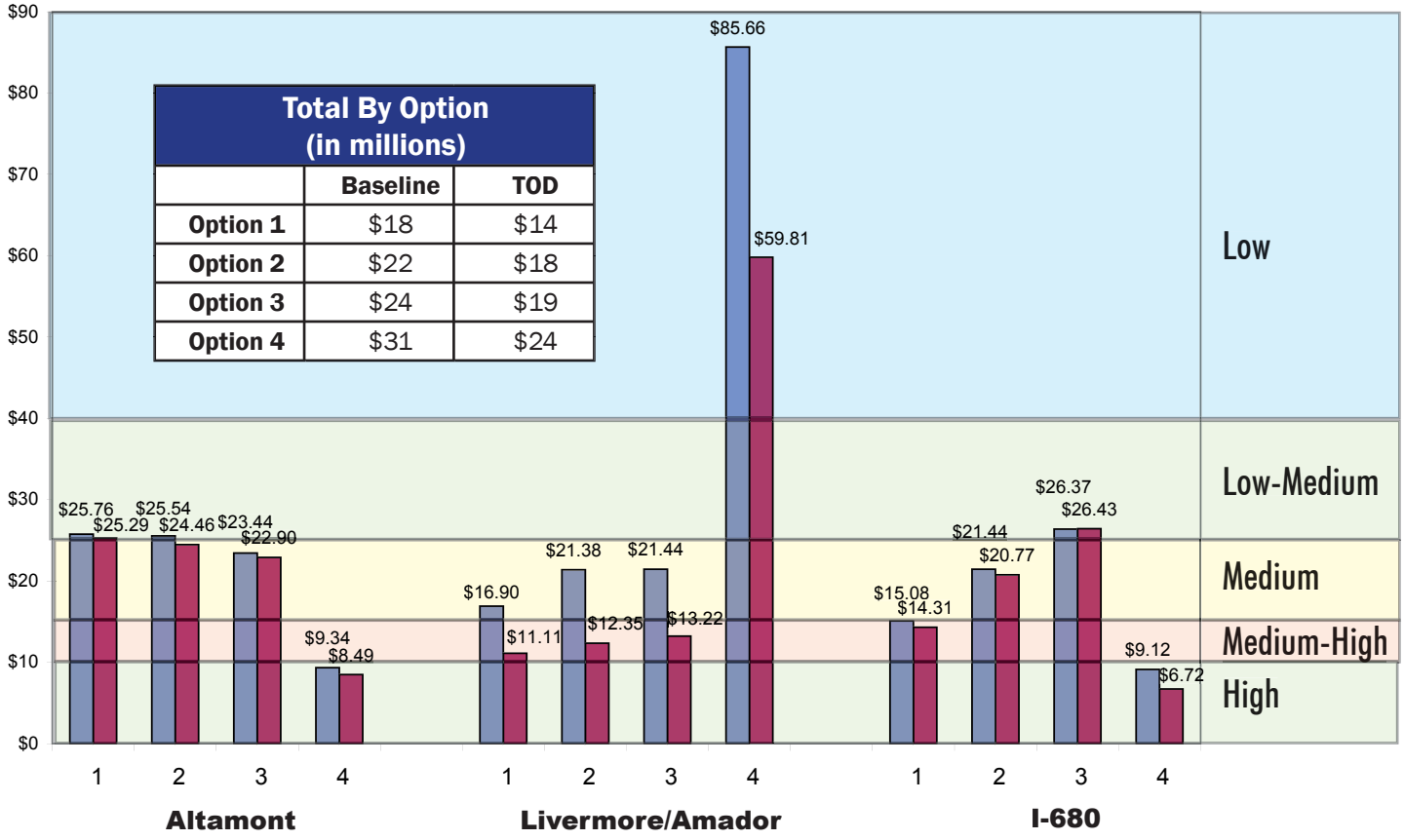
As shown on the chart below, the cost per new rider is similar for all three DMU alternatives, with each scoring "Medium" or better in all three service segments. Scores tend to be higher in the Greenville to Dublin/Pleasanton stretch, and Options 1 and 2 tend to score better than Option 3.

Figure 4-4
Cost Per New Rider Summary

	Base Case			
	Option 1	Option 2	Option 3	Option 4
Altamont	Low-Medium	Low-Medium	Medium	High
Livermore/Amador	Medium	Medium	Medium	Low
I-680	Medium	Medium	Low-Medium	High
Total Base Case	Medium	Medium	Medium	Low-Medium

	TOD			
	Option 1	Option 2	Option 3	Option 4
Altamont	Low-Medium	Medium	Medium	High
Livermore/Amador	Medium-High	Medium-High	Medium-High	Low
I-680	Medium-High	Medium	Low-Medium	High
Total TOD	Medium-High	Medium	Medium	Medium

Figure 4-5
Cost Per New Rider



Option 4 is significantly different than the other three options. The Bus Rapid Transit services over the Altamont and in the I-680 Corridor score extremely well, while the BART component gets the only "Low" score among the options analyzed.

Regional Network Connectivity

Maintaining BART as a component of an integrated regional transportation system is important not only to BART's success, but to the future economic health of the Bay Area. BART must ensure that its investments close key gaps in the overall transportation network, making seamless connections between other systems.

6. Regional Transportation Gap Closure

Each key segment of the project scores well in the category. The 680 segment connects two major BART intermodal stations, Walnut Creek and Dublin/Pleasanton. The Livermore segment connects BART with ACE and it serves the intermodal center in downtown Livermore. The Tracy segment provides for a connection to the Highway 4 Corridor transit along the Mococo line, and it provides new park & ride intercepts at I-580, I-205 and I-5. The Heavy DMU option scores highest because it allows for tBART, ACE, and Amtrak to all run on the same tracks. More importantly, it removes one of the key capacity constraints for ACE by double-tracking Altamont Pass.

Figure 4-6
Regional Transportation Gap Closure

	Option 1:	Option 2:	Option 3:	Option 4:
Altamont	Medium-High	Medium-High	High	Medium-High
	Connects to Mococo Line service and highway intercepts	Connects to Mococo Line service and highway intercepts	Allows through-routing of Mococo and Amtrak trains. Allows frequency expansion of ACE	Connects to Mococo Line service and highway intercepts
Livermore/ Amador	High	High	High	Low
	Rail options connect BART and ACE, as well as the intermodal center in Downtown Livermore			Does not allow good connection to ACE. Does not serve Downtown Livermore
I-680	High	High	High	High
	All options connect Walnut Creek and Dublin/Pleasanton BART intermodal centers as well as major employment centers at Hacienda, Bishop Ranch and Downtown Walnut Creek			
Summary	High	High	High	Medium

System and Financial Capacity

BART's System and Financial Capacity criteria are comprised of three key areas:

- **Core System Improvements:** Does the service enhance the core system by providing yard or support facilities, redundancy and recovery capabilities and/or improved station or line haul capacity
- **Capital Finance Plan:** Is the extension fully funded by reliable sources that do not compete against higher priority projects?
- **Operating Finance Plan:** Are the farebox return and other operating subsidies sufficient to place no extra burden on the District's operating revenues?

7. Core System Improvements

Only the BART extension to a yard at Greenville offers any positive benefits to the core BART system. All other alternatives generate significant new core system ridership that may trigger the need for station and line haul capacity improvements, none of which are covered in the project finance plan.

Figure 4-7
Core System Improvements

Corridor	Option 1	Option 2	Option 3	Option 4
Altamont	Low	Low	Low	Low
Livermore/ Amador	Low	Low	Low	High
I-680	Low	Low	Low	Low

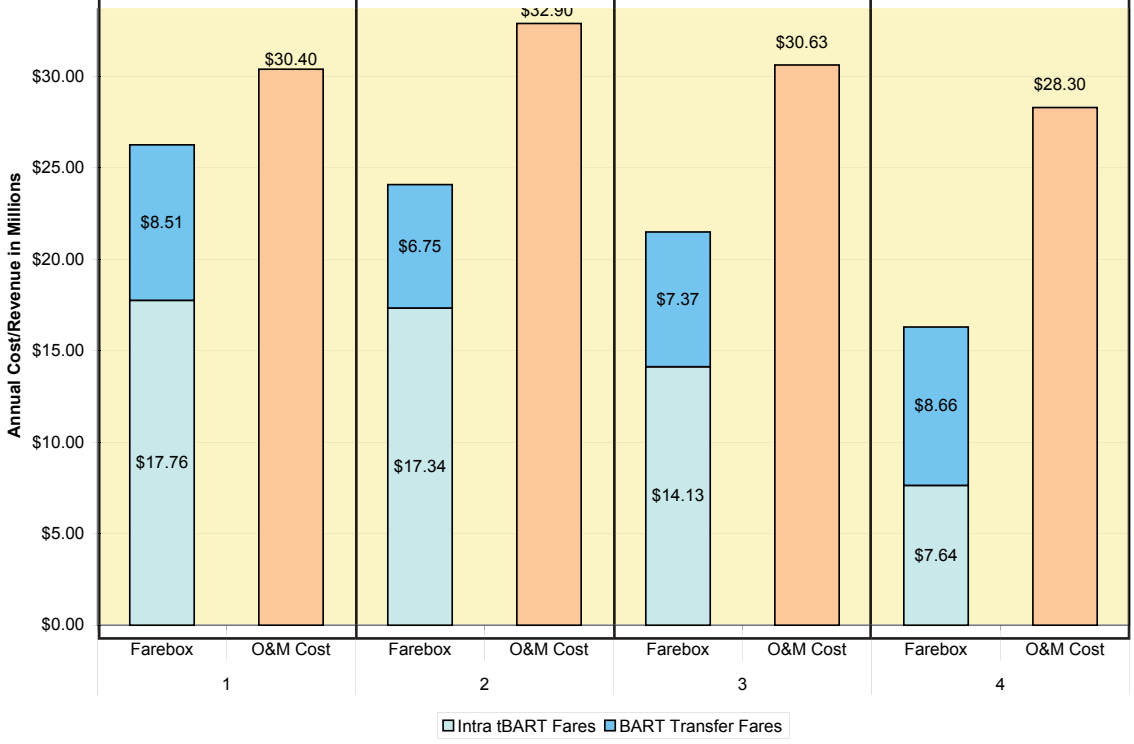
8 & 9. Capital Finance Plan and Operating Finance Plan

Staff and consultants have not yet finalized either the Capital Finance Plan or the Operating Finance Plan, pending direction from the Policy Advisory Committee about which options are worth pursuing and whether San Joaquin County should be included.

In this analysis, farebox recovery ratio of greater than 50% ranks high, while less than 30% ranks low. From an operating finance perspective, Options 1, 2 and 3, and the BRT component of Option 4, all rank well, with Options 1 and 2 scoring high, and Option 3 ranking medium. Option 4 ranks low.

Figure 4-8
Farebox Return and Operating Costs*

Option	1	2	3	4
Intra tBART	58%	53%	46%	27%
BART + tBART	86%	73%	70%	58%



* Intra tBART fares are those fares collected for trips only on the tBART system; by definition all the revenue in this category is "new". BART + tBART revenue includes fares for the entire trip length on both the BART and tBART systems for those trips with origins or destination on the tBART system. However, only "new" BART revenue is counted, and tBART + BART farebox figures are adjusted to

Partnerships

To create a successful project, BART must have the support of local communities and key stakeholders.

10. Community and Stakeholder Support

Lack of consensus among Tri-Valley communities regarding transit alignments and technologies remains an obstacle for any potential project. Local communities have been opposed to any transit use of the Iron Horse Trail corridor, the most cost effective and direct rail option available in the 680 corridor. CCTA has expressed a preference for Express Bus on I-680 as a result of their study of the I-680 corridor. Livermore has expressed a preference for a BART alignment along the I-580 median, but has recently chosen to prohibit development in North Livermore, limiting the ridership potential of the median alignment. Both Dublin and Pleasanton are awaiting the results of this study before commenting on the proposed alignments through Hacienda Business Park or via East Pleasanton and the north edge of I-580. Tracy has been enthusiastic about any new transit connection, but it is unclear whether they would support BRT on their local streets.

Figure 4-9
Partnerships

	Option 1: Light DMU Iron Horse Trail, Hacienda Downtown Tracy	Option 2: Light DMU Dougherty, East P'ton Downtown Tracy	Option 3: Heavy DMU IHT, East P'ton South Tracy	Option 4: BART + BRT
Altamont	TBD	TBD	TBD	TBD
Livermore/ Amador	TBD	TBD	TBD	High Livermore prefers a BART extension in the 580 median, but has not provided transit supportive land use policies there.
I-680	TBD	TBD	TBD	High Similar to preferred alternative in CCTA study.
Summary	TBD	TBD	TBD	TBD

Figure 4-10
BART System Expansion Scorecard

Strategic Opportunity Assessment				
Criteria	**Ratings**			
	Option 1	Option 2	Option 3	Option 4
Transit Supportive Land Use/Development Plans				
Existing Land Use: Residential and/or Employment	L	L	L	L
Existing Intermodal Connections	LM	LM	LM	L
Land Use Plans and Policies	L	L	L	L
Ridership Development Plan*				
Ridership Threshold				
Station Context				
Cost Effectiveness				
Cost per New Rider -- Base Case	M	M	M	LM
Cost per New Rider -- TOD	MH	M	M	LM
Cost per Transportation System User Benefit**				
Regional Network Connectivity				
Regional Transportation Gap Closure	H	H	H	M
System and Financial Capacity				
Core System Improvements	L	L	L	M
Capital Finance Plan	tbd	tbd	tbd	tbd
Operating Finance Plan	H	H	M	L
Partnerships				
Community & Stakeholder Support	tbd	tbd	tbd	tbd
Staff Recommendation	TBD	TBD	TBD	TBD

** Ridership Development Plans to be developed in the next phase of study & evaluated at that time.*

*** Cost per Transportation System User Benefit measurements have not yet been developed by FTA. When this measure is defined, it will be applied to the project.*

Legend

High	H
Medium-High	MH
Medium	M
Low-Medium	LM
Low	L